

## Overview of Kibo experiment candidates for around 2012

### 1. Experiment Title

On-board Microorganism Monitoring in Spacecrafts

### 2. Principal Investigator

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### 3. Outline of Experiment

From the beginning of the construction of spacecrafts, the living environment in manned spacecrafts would be progressively contaminated by microorganisms. Environmental monitoring data of spacecrafts indicate that a wide variety of microorganisms has been isolated from the air and on inner surfaces of manned spacecrafts. These microorganisms have been brought inside the spacecrafts on commodities, crew members themselves, and so on. This means it is impossible to prevent bringing microorganisms such as bacteria and fungi into manned spacecrafts. Some microorganisms isolated from the living environment of manned spacecrafts are known as possible allergens in our living environment on the ground. Many researchers and flight surgeons have been studying the correlation between the environmental microflora inside the spacecrafts and allergic reactions or opportunistic infections. They are fully aware of the risk this microbial contamination of the living environment on board poses.

Microbial monitoring has been performed on Space Stations from the beginning of long duration manned space missions. We could gain knowledge about how the environmental microflora on space stations would be progressively formed and what kinds of microorganisms have dominantly grown on and inhabit the Space Stations. However, all of formerly and currently-conducted microbial monitoring using various kinds of sample collection kits have never been on site one, in other words, these methods may be called “on ground monitoring methods”. In essence, crew members collect samples from on board inner surfaces, air, water and so on, and these samples are retrieved on ground and transported to laboratories to perform detailed microbiological analysis.

Our study's purpose is to provide a rapid and effective on board monitoring system for the crew to monitor microorganisms in the ISS cabin environment. In this project, we propose to develop an on board monitoring facility which utilizes a fluorescent microscope based system for enumeration with a newly designed microchip for cell counting, modified Lab-on-a-Chip Application Development-Portable Test

System (LOCAD-PTS) and Loop-Mediated Isothermal Amplification to realize “On Site and Real Time Microbial Monitoring” to protect crew members from microorganisms. Crew members would be able to monitor the microflora in their living environment and take countermeasures immediately against microbial contamination on board.

